

REPLY TO WRITTEN OPINION

To Mr. Mitsuji UEMAE, Examiner of the Patent Office

1. Identification of International Application

PCT/JP03/13520

2. Applicant

Name: DAIWABO CO., LTD.

Address: 6-8, Kyutaromachi 3-chome, Chuo-ku, Osaka-shi, Osaka
541-0056 JAPAN

Nationality: Japan

Residence: Japan

3. Agent

Name: IKEUCHI SATO & PARTNER PATENT ATTORNEYS

Address: 26th Floor, OAP TOWER, 8-30, Tenmabashi 1-chome,
Kita-ku, Osaka-shi, Osaka 530-6026 JAPAN

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5. Subject Matter of the Arguments

We argue against the PCT written opinion under Section 13 of the Japanese law concerning international applications or the like pursuant to the Patent Corporation Treaty (PCT Rule 66) as follows.

(1) Regarding the invention of the present application, the descriptions of claim 30 and the specification (page 27, lines 11-15 (corresponding to page 27, lines 22-29 in the English language translation of the originally filed application)) are incorporated into claim 1 as indicated in the Amendment that is filed along with the Reply TO WRITTEN OPINION. Claim 30 was canceled in the Amendment under PCT Article 19.

(2) Comparison with Cited References

(2-1) According to the Written Opinion, all the claims are determined to lack of novelty and inventive step based on Document 1 (P2002-134088A) and Document 2 (JP2002-203530A).

However, paragraph (0027), which is a relevant portion of Document 1, describes “the ternary copolymer is gelled under heat and humidity and the sheath component of the heat-adhesive composite fiber is melted at 135°C using a cylinder dryer while drying”. Thus, “pressing” is not therein described or suggested.

Also, paragraph (0017) (page 5, column 8, lines 30-33), which is a relevant portion of Document 2, describes “the water-containing wetlaid web is dried using a heat treatment machine, such as a cylinder dryer or the like, and at the same time, a denatured ethylene-vinyl alcohol copolymer is gelled under heat and humidity”. Thus, “pressing” is not therein described or suggested.

Further, Documents 1 and 2 do not describe or suggest a feature of claim 1 of the present application that “the nonwoven has a mean flow pore diameter of 0.3 to 5 µm and a bubble point pore diameter of 3 to 20 µm as measured in accordance with ASTM F 316 86”.

Furthermore, Documents 1 and 2 do not describe or suggest features of claim 25 of the present application that “B. subjecting the nonwoven sheet to a hydrophilic treatment” and “D. subjecting the water-containing sheet to gel processing by pressing and a heat-and-humidity treatment using a heat treatment device that is set to a certain temperature within a range of no less than a temperature at which the heat-and-humidity gelling resin gels and no more than “the melting point of the heat-and-humidity gelling resin - 20°C”, to cause the heat-and-humidity gelling resin to gel and be pressed and spread to form a film, and fixing the other fiber using the heat-and-humidity gelling resin gel”.

According to the distinguishing features, the present invention “As a result, a separator that achieves a desired mean flow pore diameter and bubble point pore diameter can be obtained” (page 30, lines 22-24 in the specification (corresponding to page 31, lines 2-3 in the English language translation of the originally filed application)) and “Further, when thermal press processing is employed as gel processing, the substantially uniformly-dispersed heat-and-humidity gelling resin is

caused to become a gel, which is in turn pressed and spread, and the resultant gel material can fix the other component fiber up to an inside of the nonwoven substantially uniformly." (page 30, line 24 to page 31, line 1) in the specification (corresponding to page 31, lines 7-12 in the English language translation of the originally filed application)).

(2-2) Our arguments are described below in greater detail.

(a) The specification of the present application describes "...a thermal treatment was performed at 135°C using a cylinder dryer for drying, and at the same time, the heat-and-humidity gelling resin of the fiber 1 and the sheath component of the fiber 4 temporarily bonded the fibers ... the resultant wetlaid nonwoven sheet ..." (page 35, lines 3-6 (corresponding to page 35, lines 20-25 in the English language translation of the originally filed application)). In contrast, regarding a "nonwoven bonded with a heat-and-humidity gelled material" of the subject matter of Documents 1 and 2, paragraph (0027) (page 6) of Document 1 and paragraph (0031) (page 7) of Document 2 describe "... the ternary copolymer is gelled under heat and humidity and the sheath component of the heat-adhesive composite fiber is melted at 135°C using a cylinder dryer while drying, thereby bonding the fibers together". thereof. Thus, the "nonwoven bonded with a heat-and-humidity gelled material" of Documents 1 and 2 corresponds to a "wetlaid nonwoven sheet" used in the present invention.

In an example of the present invention, the wetlaid nonwoven sheet is impregnated with water and is pressed and spread to form a film-like gelled material. As a result, the mean flow pore diameter and the bubble point pore diameter of the resultant nonwoven fiber satisfy what is claimed in claim 1.

On the other hand, the "wetlaid nonwoven sheet" of Documents 1 and 2 has a mean flow pore diameter and a bubble point pore diameter that correspond to the pre-gel processing mean flow pore diameter and the bubble point pore diameter of Tables 1 and 2 of the specification of the present application, i.e., does not satisfy what is claimed in claim 1.

As described above, Documents 1 and 2 do not describe or suggest that "the other fiber is fixed with a film-like gel material obtained by causing the heat-and-humidity gelling resin to gel under heat and humidity and be pressed and spread by pressing" of claim 1 of the

present invention and “D. subjecting the water-containing sheet to gel processing by pressing and a heat-and-humidity treatment using a heat treatment device that is set to a certain temperature within a range of no less than a temperature at which the heat-and-humidity gelling resin gels and no more than “the melting point of the heat-and-humidity gelling resin - 20°C”, to cause the heat-and-humidity gelling resin to gel and be pressed and spread to form a film, and fixing the other fiber using the heat-and-humidity gelling resin gel” of claim 25.

In addition, the present invention is essentially different from the subject matter of Documents 1 and 2 in the above-described features.

Therefore, the present invention is clearly different from the subject matter of Documents 1 and 2 in physical characteristic values, such as the bonded state of the heat-and-humidity gelled material, the mean flow pore diameter, and the bubble point pore diameter.

(b) Further, the gel processing in step D of the production method of the present invention is a pressure and heat-and-humidity treatment, which is different from the heat-and-humidity treatment using a cylinder dryer in the subject matter of Documents 1 and 2. In the present invention, the heat-and-humidity gelling resin is pressed and spread by press processing, so that appropriate mean flow pore diameter and bubble point pore diameter can be obtained. In contrast, the process in Documents 1 and 2 may secure a gap between fibers, but cannot press and spread the heat-and-humidity gelling resin to form a film. This is also clearly seen from the physical characteristic values of the mean flow pore diameter and the bubble point pore diameter described in (a).

(c) A further difference in the production method is the hydrophilic treatment. A hydrophilic treatment described in Documents 1 and 2 (claim 7) is performed after the heat-and-humidity gelling treatment, thereby improving ability to absorb and hold an alkaline electrolyte. Further, as described in paragraph (0034) of Document 1 and paragraph (0037) in Document 2, an alkaline battery is subjected to the hydrophilic treatment to improve the cycle life span (Example 2).

In contrast, the present invention is different from Documents 1 and 2 in the timing and aim of the hydrophilic treatment. Although the hydrophilic treatment is performed after the heat-and-humidity gelling

treatment in Documents 1 and 2, the hydrophilic treatment is performed before the heat-and-humidity gelling treatment (gel processing), i.e., the order of these treatments is changed in the present invention. Thereby, moisture can be uniformly provided in a nonwoven sheet. Therefore, the nonwoven sheet can be more uniformly gel-processed, leading to an appropriate mean flow pore diameter and bubble point pore diameter. Documents 1 and 2 do not describe or suggest that the hydrophilic treatment is performed before the heat-and-humidity gelling treatment.

(3) Conclusion

As described above, Documents 1 and 2 do not describe or suggest “pressing” and “the nonwoven has a mean flow pore diameter of 0.3 to 5 μm and a bubble point pore diameter of 3 to 20 μm as measured in accordance with ASTM F 316 86”, which are features in claim 1 of the present application.

Also, Documents 1 and 2 do not describe or suggest steps B and D in claim 25 of the present application.

According to these distinguishing features, the present invention can exhibit advantageous effects as described above.

Therefore, we believe that the present invention has both novelty and inventive step.

6. List of Attached Documents

(1) Amendment

one copy